

What is claimed is:

1. A photocatalytic colored member comprising a laminate formed by laminating a plurality of thin-film layers of photocatalytic material and a plurality of thin-film layers of support material, with vacant layers formed such that they are open to the outside on the rear surface side of the thin-film layers of photocatalytic material.
2. The photocatalytic colored member according to claim 1, wherein said thin-film layers of photocatalytic material have openings and said vacant layers communicate with said openings.
3. The photocatalytic colored member according to claim 1, wherein said photocatalytic material is titanium dioxide.
4. The photocatalytic colored member according to claim 1, wherein said thin-film layers of support material are made of one material selected from the group consisting of metals with a melting point of 400°C or higher, semiconductors, or insulators.
5. The photocatalytic colored member according to claim 2, wherein said openings are shaped like parallel grooves.
6. The photocatalytic colored member according to claim 2, wherein said openings are circular, elliptical or polygonal.
7. The photocatalytic colored member according to claim 2, wherein the intervals between said openings are disposed uniformly on the surface.
8. The photocatalytic colored member according to claim 2, wherein the intervals between said openings are disposed nonuniformly on the surface.
9. The photocatalytic colored member according to claim 2 which is formed by providing, upon a portion or the entire surface of the substrate, laminates consisting of said laminated thin-film layers of photocatalytic material and thin-film layers of support material which maintain said vacant layers by means of thin-film layers of support material formed at the center having a circular, elliptical or polygonal cross section.

10. The photocatalytic colored member according to claim 1, wherein the surface area of each layer of said laminated thin-film layers of photocatalytic material is equal.

11. The photocatalytic colored member according to claim 2, wherein 5 the surface area of each layer of said laminated thin-film layers of photocatalytic material is equal.

12. The photocatalytic colored member according to claim 1, wherein the surface area of each layer of said laminated thin-film layers of photocatalytic material becomes larger when going from the surface toward 10 the bottom layer.

13. The photocatalytic colored member according to claim 2, wherein the surface area of each layer of said laminated thin-film layers of photocatalytic material becomes larger when going from the surface toward 15 the bottom layer.

14. The photocatalytic colored member according to claim 1, wherein the surface area of each layer of said laminated thin-film layers of photocatalytic material becomes smaller when going from the surface toward 20 the bottom layer.

15. The photocatalytic colored member according to claim 2, wherein 25 the surface area of each layer of said laminated thin-film layers of photocatalytic material becomes smaller when going from the surface toward the bottom layer.

16. The photocatalytic colored member according to claim 1, wherein a film of titanium oxide with the anatase structure is used as the thin-film 25 layers of photocatalytic material.

17. The photocatalytic colored member according to claim 2, wherein a film of titanium oxide with the anatase structure is used as the thin-film layers of photocatalytic material.

18. The photocatalytic colored member according to claim 3, wherein 30 a film of titanium oxide with the anatase structure is used as the thin-film layers of photocatalytic material.

19. The photocatalytic colored member according to claim 4, wherein a film of titanium oxide with the anatase structure is used as the thin-film layers of photocatalytic material.

20. The photocatalytic colored member according to claim 5, wherein 5 a film of titanium oxide with the anatase structure is used as the thin-film layers of photocatalytic material.

21. The photocatalytic colored member according to claim 6, wherein a film of titanium oxide with the anatase structure is used as the thin-film layers of photocatalytic material.

10 22. The photocatalytic colored member according to claim 7, wherein a film of titanium oxide with the anatase structure is used as the thin-film layers of photocatalytic material.

15 23. The photocatalytic colored member according to claim 8, wherein a film of titanium oxide with the anatase structure is used as the thin-film layers of photocatalytic material.

24. The photocatalytic colored member according to claim 9, wherein a film of titanium oxide with the anatase structure is used as the thin-film layers of photocatalytic material.

25. The photocatalytic colored member according to claim 10, 20 wherein a film of titanium oxide with the anatase structure is used as the thin-film layers of photocatalytic material.

26. The photocatalytic colored member according to claim 11, wherein a film of titanium oxide with the anatase structure is used as the thin-film layers of photocatalytic material.

25 27. The photocatalytic colored member according to claim 12, wherein a film of titanium oxide with the anatase structure is used as the thin-film layers of photocatalytic material.

28. The photocatalytic colored member according to claim 13, 30 wherein a film of titanium oxide with the anatase structure is used as the thin-film layers of photocatalytic material.

29. The photocatalytic colored member according to claim 14, wherein a film of titanium oxide with the anatase structure is used as the thin-film layers of photocatalytic material.

5 30. The photocatalytic colored member according to claim 15, wherein a film of titanium oxide with the anatase structure is used as the thin-film layers of photocatalytic material.

31. The photocatalytic colored member according to any of claim 1, wherein a film of titanium oxide with the amorphous structure is used as the thin-film layers of photocatalytic material.

10 32. The photocatalytic colored member according to any of claim 2, wherein a film of titanium oxide with the amorphous structure is used as the thin-film layers of photocatalytic material.

33. The photocatalytic colored member according to any of claim 3, wherein a film of titanium oxide with the amorphous structure is used as the thin-film layers of photocatalytic material.

15 34. The photocatalytic colored member according to any of claim 4, wherein a film of titanium oxide with the amorphous structure is used as the thin-film layers of photocatalytic material.

35. The photocatalytic colored member according to any of claim 5, 20 wherein a film of titanium oxide with the amorphous structure is used as the thin-film layers of photocatalytic material.

36. The photocatalytic colored member according to any of claim 6, wherein a film of titanium oxide with the amorphous structure is used as the thin-film layers of photocatalytic material.

25 37. The photocatalytic colored member according to any of claim 7, wherein a film of titanium oxide with the amorphous structure is used as the thin-film layers of photocatalytic material.

38. The photocatalytic colored member according to any of claim 8, 30 wherein a film of titanium oxide with the amorphous structure is used as the thin-film layers of photocatalytic material.

39. The photocatalytic colored member according to any of claim 9, wherein a film of titanium oxide with the amorphous structure is used as the thin-film layers of photocatalytic material.

5 40. The photocatalytic colored member according to any of claim 10, wherein a film of titanium oxide with the amorphous structure is used as the thin-film layers of photocatalytic material.

41. The photocatalytic colored member according to any of claim 11, wherein a film of titanium oxide with the amorphous structure is used as the thin-film layers of photocatalytic material.

10 42. The photocatalytic colored member according to any of claim 12, wherein a film of titanium oxide with the amorphous structure is used as the thin-film layers of photocatalytic material.

15 43. The photocatalytic colored member according to any of claim 13, wherein a film of titanium oxide with the amorphous structure is used as the thin-film layers of photocatalytic material.

44. The photocatalytic colored member according to any of claim 14, wherein a film of titanium oxide with the amorphous structure is used as the thin-film layers of photocatalytic material.

20 45. The photocatalytic colored member according to any of claim 15, wherein a film of titanium oxide with the amorphous structure is used as the thin-film layers of photocatalytic material.

46. A method of manufacturing a photocatalytic colored member comprising the steps of:

25 laminating a plurality of layers of thin-film layers of photocatalytic material and thin-film layers of support material,

forming a plurality of openings through a plurality of layers of the multi-layer film by means of physical dry etching with argon ions or the like, and next,

30 using wet etching to remove excess support material to form, on the rear surface side of the thin-film layers of photocatalytic material, vacant layers that are open to the outside.

47. A method of manufacturing a photocatalytic colored member comprising the steps of:

laminating a plurality of layers of thin-film layers of photocatalytic material and thin-film layers of support material, and

5 using dry etching to form, on the rear surface side of the thin-film layers of photocatalytic material, vacant layers that are open to the outside, where as the raw material gas for dry etching, argon gas or oxygen gas as the gas that performs physical etching is used simultaneously with chlorine gas or hydrogen chloride gas as the gas that performs chemical etching.

10 48. The method of manufacturing a photocatalytic colored member according to claim 46, wherein said thin-film layers of photocatalytic material are made of titanium oxide, and the equivalent surface area is increased by etching the titanium oxide film on the surface with wet etching or dry etching.

15 49. The method of manufacturing a photocatalytic colored member according to claim 47, wherein said thin-film layers of photocatalytic material are made of titanium oxide, and the equivalent surface area is increased by etching the titanium oxide film on the surface with wet etching or dry etching.

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